

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-17 (Canceled).

Claim 18 (New): A radio communication apparatus at a transmission side that includes a plurality of transmission antennas and performs a communication using at least one carrier, the radio communication apparatus comprising:

a channel dividing unit that divides a transmission signal into a plurality of channels based on channel structure information indicating a method of structuring a multiple-input-multiple-output channel informed from a communication apparatus at a reception side; and
a space-time-coding unit that realizes transmission diversity by performing a space-time-coding processing for each of the channels divided.

Claim 19 (New): The radio communication apparatus according to claim 18, further comprising:

a beam forming unit that performs an individual direction control by a complex multiplication with respect to each of the channels to which the space-time-coding processing is performed, and distributes the channels for each of the transmission antennas; and
an adding unit that adds all of the transmission signals to which the direction control is performed corresponding to each of the transmission antennas.

Claim 20 (New): A radio communication apparatus at a reception side that includes at least one reception antenna and performs a communication using at least one carrier, the radio communication apparatus comprising:

a channel estimating unit that estimates a channel gain between a transmission side and the reception side; and

a channel-structure determining unit that determines a structure of a multiple-input-multiple-output channel based on a result of estimation of the channel gain, a physical configuration of a communication apparatus at the transmission side, and a physical configuration of the radio communication apparatus, and informs channel structure information that is a result of determination to the communication apparatus at the transmission side.

Claim 21 (New): The radio communication apparatus according to claim 20, wherein the channel-structure determining unit generates the channel structure information based on at least one of the result of the estimation of the channel gain, number of antennas of the communication apparatus at the transmission side and the radio communication apparatus, and a computational capability of the communication apparatus at the transmission side and the radio communication apparatus.

Claim 22 (New): The radio communication apparatus according to claim 21, further comprising a coherent-band width measuring unit that measures a coherent bandwidth at a channel by observing a reception signal, wherein

the channel estimating unit divides a signal band into a plurality of subcarrier groups having same channel information based on a result of measurement of the coherent bandwidth, and performs the estimation of the channel gain in units of a subcarrier group.

Claim 23 (New): The radio communication apparatus according to claim 22, wherein the channel estimating unit performs the estimation of the channel gain for a plurality of

subcarriers within the subcarrier group, and averages results of the estimation of the channel gain for the subcarriers.

Claim 24 (New): A radio communication apparatus that includes a plurality of transmission antennas and at least one reception antenna, and performs a communication using at least one carrier, the radio communication apparatus comprising:

a transmission-processing unit comprising:

a channel dividing unit that divides a transmission signal into a plurality of channels based on channel structure information indicating a method of structuring a multiple-input-multiple-output channel informed from a communication apparatus at a reception side; and

a space-time-coding unit that realizes transmission diversity by performing a space-time-coding processing for each of the channels divided; and

a reception-processing unit comprising:

a channel estimating unit that estimates a channel gain between a transmission side and a reception side; and

a channel-structure determining unit that determines a structure of a multiple-input-multiple-output channel based on a result of estimation of the channel gain, a physical configuration of a communication apparatus at the transmission side, and a physical configuration of a communication apparatus at the reception side, and informs channel structure information that is a result of determination to the communication apparatus at the transmission side.

Claim 25 (New): The radio communication apparatus according to claim 24, wherein the channel-structure determining unit generates the channel structure information based on

at least one of the result of the estimation of the channel gain, number of antennas of the communication apparatus at the transmission side and the communication apparatus of the reception side, and a computational capability of the communication apparatus at the transmission side and the communication apparatus of the reception side.

Claim 26 (New): The radio communication apparatus according to claim 25, wherein the reception-processing unit further includes a coherent-band width measuring unit that measures a coherent bandwidth at a channel by observing a reception signal, wherein the channel estimating unit divides a signal band into a plurality of subcarrier groups having same channel information based on a result of measurement of the coherent bandwidth, and performs the estimation of the channel gain in units of a subcarrier group.

Claim 27 (New): The radio communication apparatus according to claim 26, wherein the channel estimating unit performs the estimation of the channel gain for a plurality of subcarriers within the subcarrier group, and averages results of the estimation of the channel gain for the subcarriers.

Claim 28 (New): A transmitter that includes a plurality of transmission antennas and transmits a transmission signal to a receiver using at least one carrier, the transmitter comprising:

a channel dividing unit that divides a transmission signal into a plurality of channels based on channel structure information indicating a method of structuring a multiple-input-multiple-output channel informed from the receiver; and

a space-time-coding unit that realizes transmission diversity by performing a space-time-coding processing for each of the channels divided.

Claim 29 (New): The transmitter according to claim 28, further comprising:
a beam forming unit that performs an individual direction control by a complex multiplication with respect to each of the channels to which the space-time-coding processing is performed, and distributes the channels for each of the transmission antennas; and
an adding unit that adds all of the transmission signals to which the direction control is performed corresponding to each of the transmission antennas.

Claim 30 (New) A receiver that includes at least one reception antenna and receives a signal from a transmitter using at least one carrier, the receiver comprising:

a channel estimating unit that estimates a channel gain between a transmission side and a reception side; and

a channel-structure determining unit that determines a structure of a multiple-input-multiple-output channel based on a result of estimation of the channel gain, a physical configuration of the transmitter, and a physical configuration of the receiver, and informs channel structure information that is a result of determination to the transmitter.

Claim 31 (New): The receiver according to claim 30, wherein the channel-structure determining unit generates the channel structure information based on at least one of the result of estimation of the channel gain, number of antennas of the transmitter and the receiver, and a computational capability of the transmitter and the receiver.

Claim 32 (New): The receiver according to claim 31, further comprising a coherent-band width measuring unit that measures a coherent bandwidth at a channel by observing a reception signal, wherein

the channel estimating unit divides a signal band into a plurality of subcarrier groups having same channel information based on a result of measurement of the coherent bandwidth, and performs the estimation of the channel gain in units of a subcarrier group.

Claim 33 (New): The receiver according to claim 32, wherein the channel estimating unit performs the estimation of the channel gain for a plurality of subcarriers within the subcarrier group, and averages results of the estimation of the channel gain for the subcarriers.

Claim 34 (New): A radio communication system comprising:
a transmitter that transmits a transmission signal to a receiver using at least one carrier, the transmitter comprising:

a plurality of transmission antennas;

a channel dividing unit that divides a transmission signal into a plurality of channels based on channel structure information indicating a method of structuring a multiple-input-multiple-output channel informed from the receiver; and

a space-time-coding unit that realizes transmission diversity by performing a space-time-coding processing for each of the channels divided; and

a receiver that receives the transmission signal from the transmitter using at least one carrier, comprising:

at least one reception antenna;

a channel estimating unit that estimates a channel gain between a transmission side and a reception side; and

a channel-structure determining unit that determines a structure of a multiple-input-multiple-output channel based on a result of estimation of the channel gain, a

physical configuration of the transmitter, and a physical configuration of the receiver, and informs channel structure information that is a result of determination to the transmitter.

Claim 35 (New): The radio communication system according to claim 34, wherein the channel-structure determining unit generates the channel structure information based on at least one of the result of estimation of the channel gain, number of antennas of the transmitter and the receiver, and a computational capability of the transmitter and the receiver.

Claim 36 (New): The radio communication system according to claim 35, wherein the receiver further includes a coherent-band width measuring unit that measures a coherent bandwidth at a channel by observing a reception signal, wherein the channel estimating unit divides a signal band into a plurality of subcarrier groups having same channel information based on a result of measurement of the coherent bandwidth, and performs the estimation of the channel gain in units of a subcarrier group.

Claim 37 (New): The radio communication system according to claim 36, wherein the channel estimating unit performs the estimation of the channel gain for a plurality of subcarriers within the subcarrier group, and averages results of the estimation of the channel gain for the subcarriers.